Objective Team 4 - Economic and Social
March 2015

| Team Members	Title
Susan Capalbo (OSU)	Team Lead-Department Head and Professor, Applied Economics
John Antle (OSU)	Professor, Applied Economics
Kate Painter (UI)	Farm and Ranch Economist, Ag. Econ. & Rural Sociology
Jeff Reimer (OSU)	Associate Professor, Applied Economics
Dennis Roe (WSU)	Adjunct Faculty, Crop and Soil Sciences
J D Wulfhorst (UI)	Professor, Agricultural Economics & Rural Sociology
Leigh Bernacchi (UI)	Post-Doc. Researcher; Education and and Communication Coordinator, Ag. Econ. & Rural Soc.
Laurie Houston (OSU)	Faculty Research Assistant, Applied Economics
Hilary Davis (UI)	Research Associate, Ag Econ & Rural Sociology
Jenna Way (OSU)	MS Student, Applied Economics
Xiaojuan Zheng (OSU)	PhD Student, Applied Economics (graduated Dec 2014)
SnehaGantla (UI-SSRU)	Research Scientist, Social Science Research Unit
Jenny Gray (UI)	Research Scientist, Agricultural Economics & Rural Sociology

Award #2011-68002-30191

Team 4's Goals and Objectives

To determine social and economic factors influencing agricultural management, technology adoption, and development of policy to improve production efficiency while mitigating greenhouse gas emissions, we will:

- Assess alternative production systems for adapting to and mitigating climate change to meet NIFA targets for reduced emissions and increased efficiency;

- Employ social and economic surveys to understand the factors governing alternative system adoption;

- Conduct surveys to obtain spatially linked data to characterize the social and economic dimensions;

- Fund graduate students and summer interns to support these efforts.
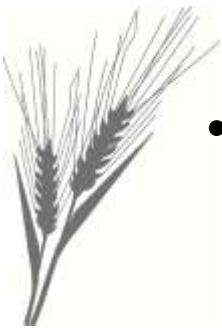
REACCH Conceptual Framework and Logic Model

Situation | **Inputs** | **Activities** | **Outputs** | **Outcomes & Impacts**

Situation
- Changing climate
- Diverse socio economics
- Soil quality/erosion concerns
- Low crop diversity
- Increasing demand

Inputs
Diverse expertise and resources

Activities
- Downscaled Climate Models
- Transdisciplinary Framework
- GHG, C, N, Water Monitoring
- Dynamic AEZ's
- Long-term Experiments
- Biotic Factor Monitoring and Modeling
- Socioeconomic Description
- K-12 Curriculum Development
- Undergrad Internships Integrated Graduate Education
- Develop Diverse Extension Platforms
- Stakeholder Engagement
- Cyberinfrastructure Development

Outputs
- Integrated Models/Scenarios RAPs AEZ LCA CropSyst
- C, N, Water, Energy Budgets
- GHG Flux Models
- Recommended Climate Friendly Strategies
- Assessment of Socioeconomic Environment's Capacity to Support Change
- K-12 Curricula
- Trained Graduate and Undergraduate Students
- Webinars Apps Field Days Publications Interactive tools
- Networks and Cyberinfrastructure

Outcomes & Impacts
Increased knowledge, infrastructure, trained scientists and educators and resources
- Decreasing GHG emissions
- Increasing N, Water and energy efficiency
- Improving tillage and residue management practices
- Crop diversification
- Utilization of decision tools
- Trained scientists and educators
- Increased grower knowledge
- RAPS/CropSyst/LCA/AEZ
- Improved understanding of biotic factors
- Long term experiments
- Data and data archives

Impacts beyond REACCH: National and International Connections and Framework for Long-term Interdisciplinary Research

Team Highlights

Longitudinal Grower Surveys

Three years of surveys have been intensively analyzed as part of Hilary's master's thesis, and she is conducting the fourth year of surveys this spring.

General Public and Agricultural Producer Surveys

Established a baseline of general public views on PNW climate change effects, documenting a majority of us in the region believe climate change is human-caused.

Established a baseline of producer perspectives, including trends of weather patterns changing and temperatures fluctuating, but natural causes explain these.

Climate Change Learning Modules

Working with Oregon State University (OSU) E-campus to deliver climate change information through flexible online learning modules. These learning modules provide an overview of climate science and the role of economics.
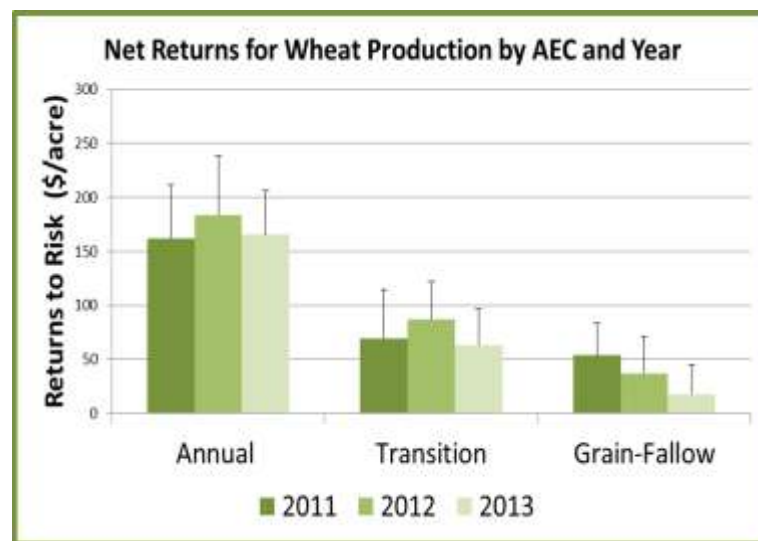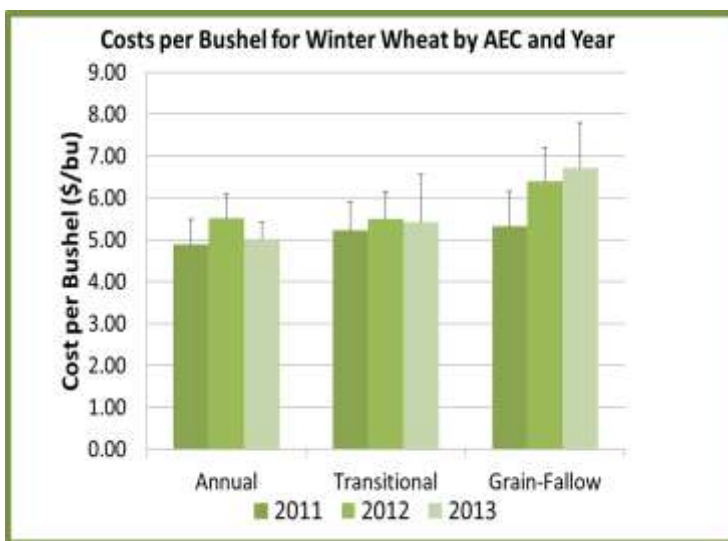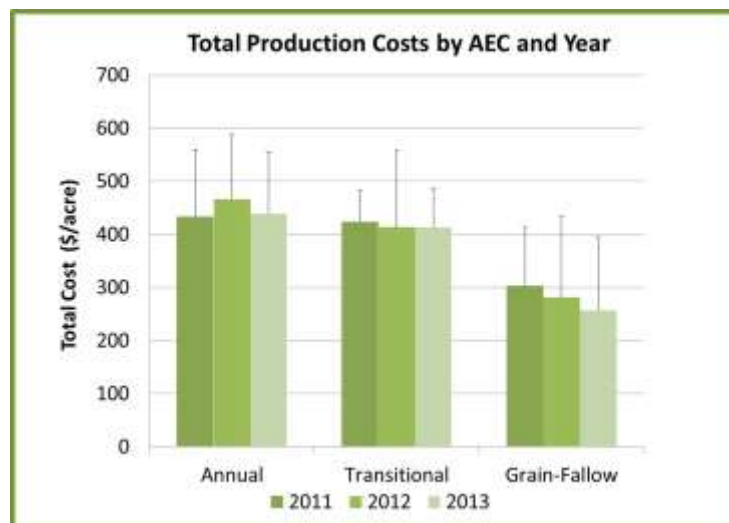
Decision support tools

Collaboration with Objective 8 and others to develop decision support software (AgBiz Logic) that is simple and provides context for addressing impacts of climate, technology and prices on future net returns and environmental outcomes; web based and adaptable to specific locations and management.

# Highlights of Longitudinal Producer Survey Results

- Costs/acre are higher in the Annual and Transitional AECs as they are farming more intensively and they can afford to spend more per acre.

- Costs/bushel are much higher in the Grain-Fallow AEC because they have fewer bushels to spread their costs over.

- In very dry years it is a challenge for the Grain-Fallow AEC to remain profitable .

Total Production Costs by AEC and Year

Costs per Bushel for Winter Wheat by AEC and Year

Net Returns for Wheat Production by AEC and Year

Highlights of the General Public and Agricultural Producer Surveys

•Baseline of general public views on PNW climate change effects, documenting a majority ofpeoplein the region believe climate change is*primarily* human-caused.

•Baseline of producer perspectives, including observed changes in weather patterns, temperature shifts, and perceived economic and environmental risks.

Producers' perceived economic and environmental risk
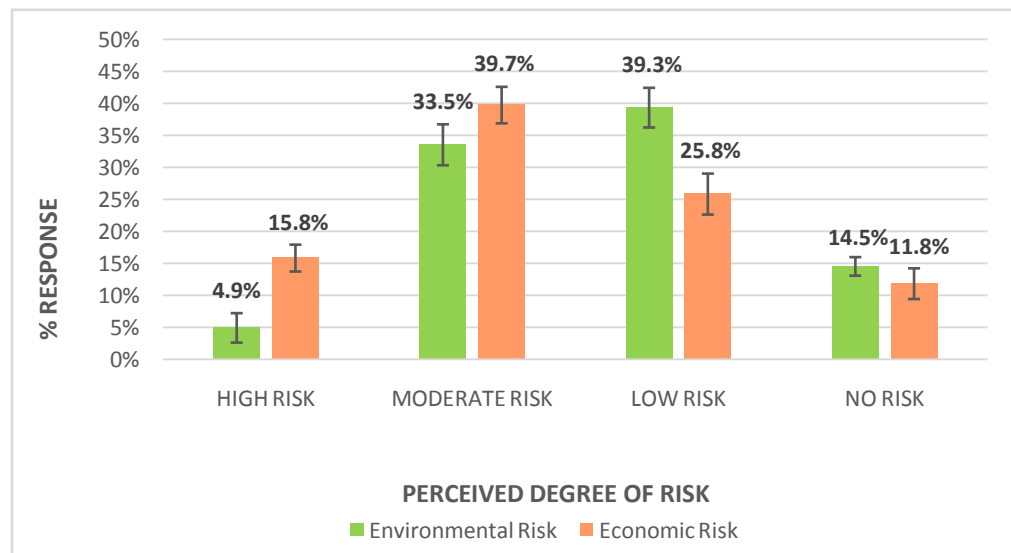
Highlights of the Climate Change Learning Modules

We have been working with OSU E-campus to deliver climate change information through flexible online learning modules that provide an overview of climate science and the role of economics.

- One learning module developed with software called Pachyderm. This is a multimedia software tool that incorporates audio, video, text, and images that taps into many learning styles.

- The module provides an overview of climate science and economics of climate change. It incorporates dozens of videos containing information regarding global and regional impacts of climate change on water, oceans, forests, and agriculture, as well as potential economic impacts.

- It also contains information on the physical science of climate change, mitigation and adaptation strategies, and identifies key vulnerabilities for the PNW.

- Shorter module series under construction to provide same information in smaller units to easily incorporate into class curriculums, and accessible to the general public.

(see "*Interactive learning modules for climate change education*" in the annual report for more on this topic.)

Highlights of AgBizLogic™

- Developing a web-based decision support tool for assessing the impacts of alternative management practices (at the field/farm level) via cooperation from Oregon Climate Research Institute & the Climate Hub.

- AgBizLogic will incorporate AgEnvironment™ into the existing suite of financial programs (AgProfit,™ AgLease,™ and AgFinance™).

- These integrated programs will be accessible by ipads, iphones, and PC's.

- Farmers, ranchers, and land use managers will be able to visualize and understand the range of changes (exposure to risk) to their net returns and to understand connections to both onsite and offsite environmental changes.

- Exploring options to incorporate down-scaled climate and crop yield information specific to the respondents' farming area from Objective 1 for long term and short term management decisions.

- PILOT LAUNCHES Late Spring/Summer 2015!!!

   WATCH FOR TRAILERS Coming to your screen soon

**Accumulated Growing Degree Days (Base 50°F) near Wenatchee Heights**

Legend:
- Observations
- Modeled Baseline
- Modeled Future
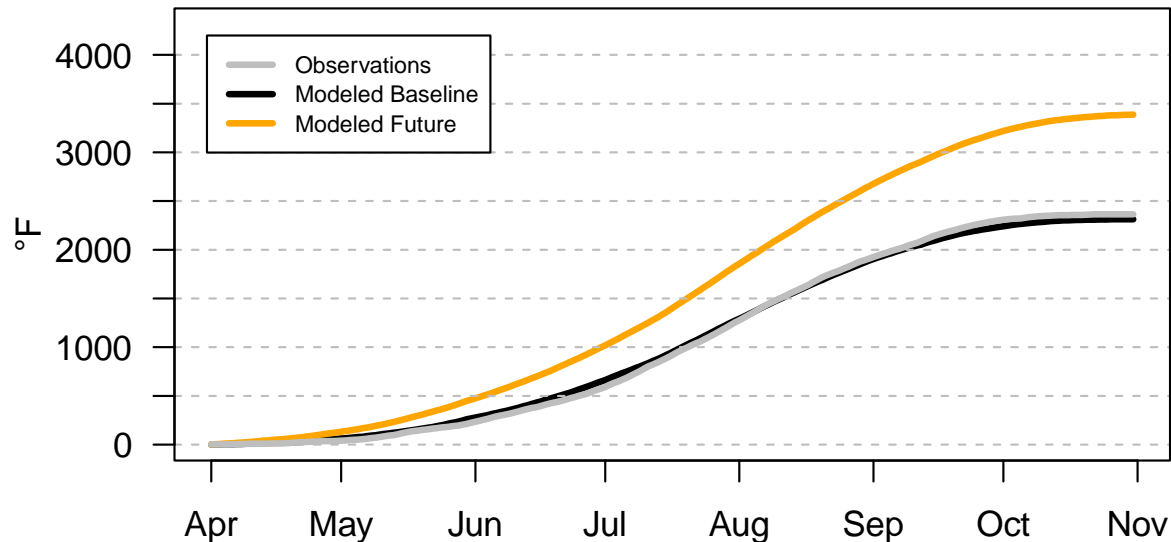
Observations are averaged over 2009−2014; Modeled baseline is averaged over 1950−2005;
Modeled future is averaged over 2040−2069 for a high emissions scenario for two climate models.
The two climate models were averaged.
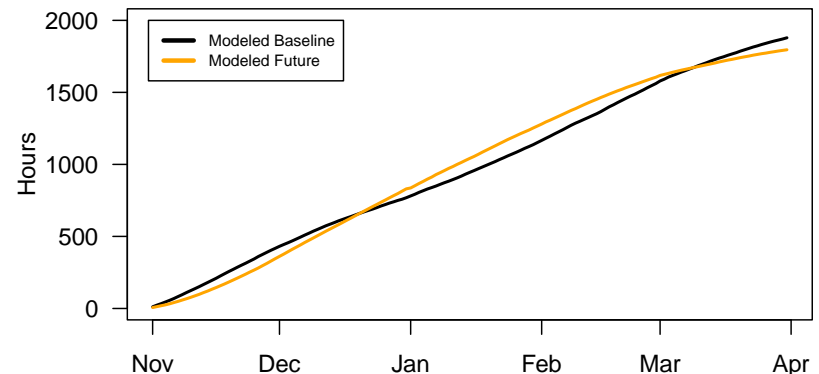
EXAMPLE OF CLIMATE INFO FOR AGBIZ LOGIC

Source: Meghan Dalton and John Stevenson, Oregon Climate Change Research Institute, OSU

Minimum Temperature (°F) near Wenatchee Heights
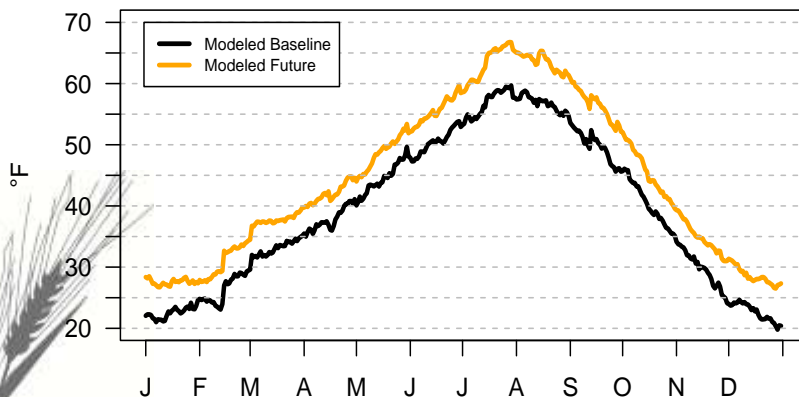
Legend:
- Modeled Baseline
- Modeled Future

Modeled baseline is averaged over 1950−2005 and modeled future is averaged over 2040−2069
for a high emissions scenario for two climate models. The two climate models were averaged together.

Accumulated Chill Hours (Between 32°F and 45°F) near Wenatchee Heights
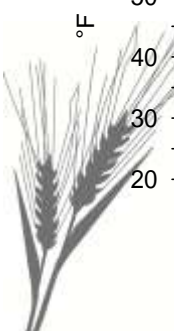
Legend:
- Modeled Baseline
- Modeled Future

Modeled baseline is averaged over 1950−2005 and modeled future is averaged over 2040−2069
for a high emissions scenario for two climate models. The two climate models were averaged

List of outputs above and beyond Proposal

- Development of **video-and-text case studies** based on in-depth video interviews of a smaller number of exemplary growers, some of whom are also in the longitudinal survey.

- Extension bulletin with **"typical" cost and returns by AEC for the 4 years of the longitudinal survey,** with information on the range of costs and returns as well.Spreadsheet format with detailed machinery cost data will be helpful forresearch &produc.

- Climate change **learning modules that explain the science of climate change** and, expected impacts of climate change, based on IPCC reports and the Northwest Climate Assessment.

- Adapting and using AgTools software to **connect growers and researchers in order to incorporate downscaled information** on climate and yield changes into a financial calculator.

- Develop**additional case study modules within AgTools**that incorporate climate change criteria and associated management alternatives and their potential impacts on farm net returns.

- Development of a Computable General Equilibrium (CGE) model in order to **evaluate the price and cost effects of Shared Socio-Economic Pathway scenarios** developed by objective team 1.

- Development of a **"best practices" project for social science data management** in climate change and natural resources

- Presented **AgBizLogic™ at the Fieldmens Meeting** in Wenatchee Feb 2015. Economic Considerations in Apple Production with Climate Change and Weather Variability.

Update on milestones

| Milestone/Deliverable	Status	Completion Date
Milestones:		
Longitudinal producer surveys (years 1-4)	Years 1-3 complete, Year 4 ongoing	End of Year 5
Key informant interviews	In progress	End of Year 5
General public survey	Survey complete and data being analyzed	Survey complete, analysis in progress
Agricultural producer survey (baseline Y2, follow-up Y5)	Baseline complete and analyzing data; follow-up developing	End of Year 5 (and beyond)
Deliverables:		
Spatial representation of adoption likelihood incorporating socioeconomic variability	In progress	End of Year 5
Socio-geographic functions for N, water, energy use shifts due to crop, policy, climate	Ambitious, but can complete with collaboration from other teams.	End of Year 5

Y5 & Y6 Challenges

Obj 4 Challenges

- Collaborations needed with other teams for socio-geographic functions of N, water, and energy use shifts due to crop, policy, climate deliverable

- Integrating survey findings with the modeling and AEC groups

- Estimating farm level economic and environmental impacts of policy scenarios using representative farms and extrapolating to the region

Overall Challenges

- Systematic method to measure REACCH'simpact on the sustainability of IPNW cereal production

- Additional clarity about no-cost extension funding

- Engage more with policy makers, as per stated project goal
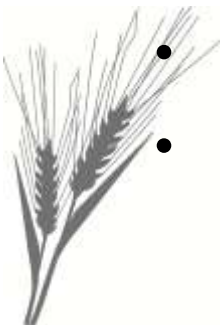
Themes for Global Café

- Howto illustrate the breadth of REACCH's impact:
  - quantify the benefits from more cross cutting, spatially-explicit interdisciplinary research; &
  - attribute observed changes in management practices over the past five years — a very short time -- to REACCH

- Y6 funding process & legacy — how can we best useY6 to strengthenlongterm impacts and outputs from REACCH?

- Need to engage stakeholders and policy makers more:
  - what actions & resources will this involve?
  - what are key pieces of information that would matter for policy makers to address climate change?

- Methods to shift a balance of emphasis from adaptation to mitigation at landscape scales